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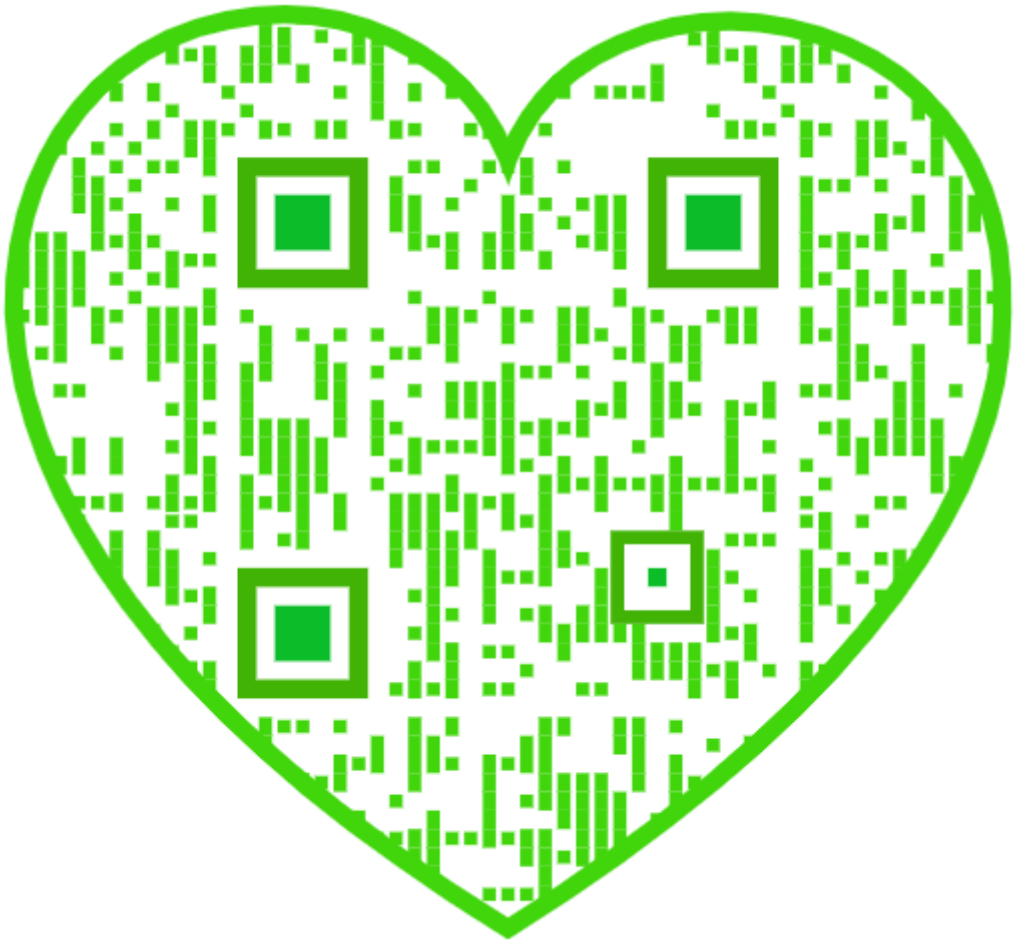

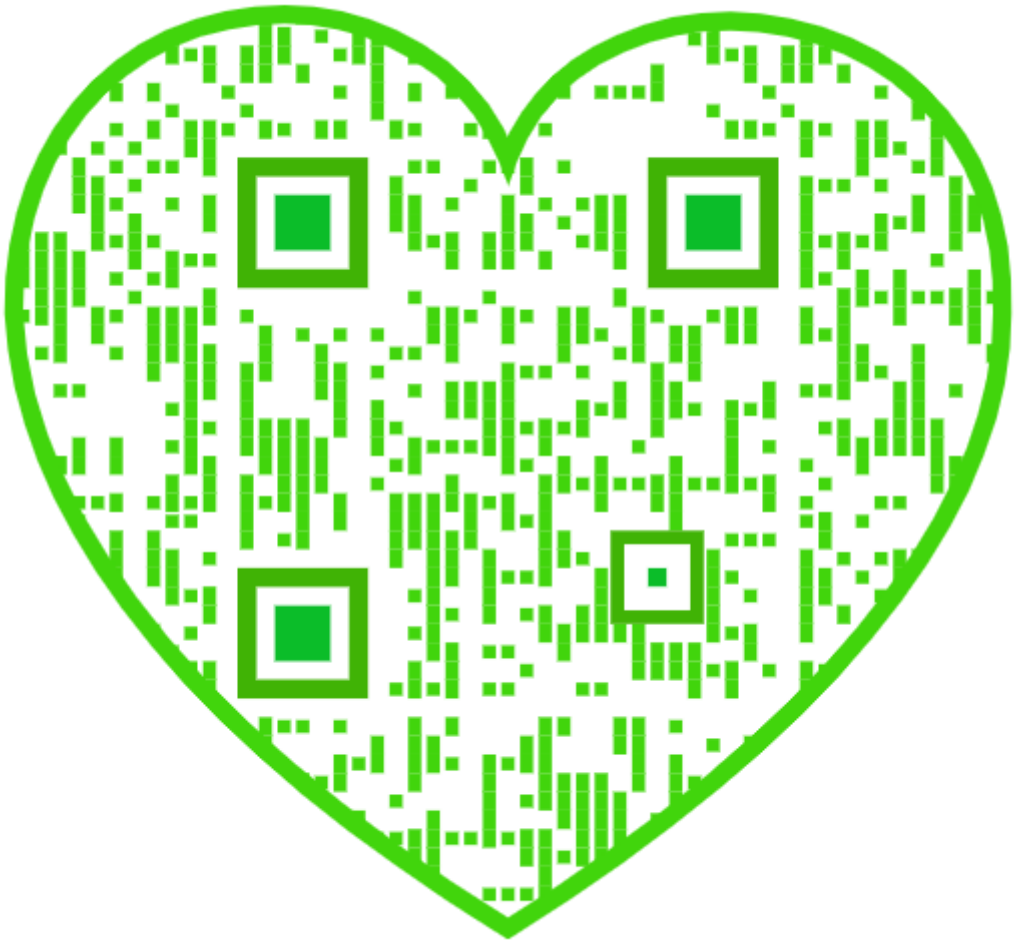

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SANITATION AND HEALTH

SANITATION AND HEALTH

BY

BRIG.-GENERAL R. C. HART, V.C. C.B. R.E.

COMMANDING A DISTRICT IN INDIA

REVISED BY

BRIG.-SURG. LT.-COL. T. H. HENDLEY, C.I.E.

M.R.C.S. L.R.C.P. ETC.

HON. VICE-PRESIDENT, TROPICAL SECTION, OF THE INTERNATIONAL CONGRESS OF HYGIENE AND DEMOGRAPHY OF 1894; DELEGATE FOR RAJPUTANA, AND MEMBER OF THE INDIAN COMMITTEE, INTERNATIONAL CONGRESS OF 1891; ADMINISTRATIVE MEDICAL OFFICER, RAJPUTANA, AND RESIDENCY SURGEON, JEYPORE

Authorised by the War Office for use in all Army Schools.

FIFTH EDITION.

WILLIAM CLOWES AND SONS, LIMITED
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1898

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"*Health,*" said Napoleon, "*is indispensable in war, and cannot be replaced by anything.*"

"*No man,*" says Lord Wolseley, "*can be a truly great general who is ignorant of the great laws upon which sanitary science is based. One of the greatest leaders of men was Moses, and it is curious as well as instructive to read in Holy Writ the laws he enacted for the sanitation of his great camps. If we do not take care of the health of our men, we shall never be able to bring them 'smiling to the post'; and unless they go into battle laughing with health and the good spirits which follow upon good digestion, we must not expect great things from them.*"—Extract from Letter to the Author.

"*I regard courage as the mental correlative and equivalent of perfect physical health. And my experience has taught me that high courage is generally accompanied by bodily soundness.*"—Lord Wolseley, 'Fortnightly Review,' 1888.

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COMMANDING THE FORCES IN IRELAND.

PREFACE

TO THE THIRD EDITION.

THE favourable reviews of our pamphlet have determined us to publish another edition.

The following extracts express the importance of the subject.

"Moreover, the conviction struck deeply into my mind that probably one-third, at least, of the incidental illness of the kingdom, including perhaps much of childbed illness, and some of the fatal results of surgical operations in hospitals and private houses—surgical calamities Sir James Paget would call them—are the direct result of drainage defects, and therefore *can be*, and *ought to be*, prevented."*

"When disease arises which we call 'preventable,' depend upon it someone ought to have prevented it."*

* 'Dangers to Health.' T. P. Teale.

"As a rule the soundness of the sanitary arrangements of a house is taken for granted, and never questioned until 'drain-begotten' illness has broken out. In other words, we employ illness and death as our drain detectives." *

"How many medical men can he tell me of who understand the sanitary condition of *their own home*, or have adequately ascertained that those conditions are, as far as our knowledge at present goes, free from dangers to health." *

Anyone who understands what the sanitary arrangements of a house should be, and who has been in quest of a house, or of lodgings, must have been struck by the risks people run who are ignorant of sanitation.

In 1894, 9 officers and 300 men died in Bengal of one preventable disease—enteric fever.

R. C. H.
T. H. H.

1*st March*, 1897.

* 'Dangers to Health.' T. P. Teale.

PREFACE

TO THE FIRST EDITION.

In the rainy season of 1888 there was much sickness among the troops at the station of Ranikhet; and Colonel R. C. Hart, who was then in command of the Rohilkhand District, delivered the following lecture to the troops in the station.

The lecture has been revised by me at Colonel Hart's request, and as it deals with the prevention of evils which are always present in India, we have decided upon publishing it, in order that young officers and men going to India and in India may be warned, and may know how enteric fever and other preventable diseases can be guarded against by the exercise of ordinary common sense and every-day precautions.

I have been able to add very little to what Colonel Hart has said, as I feel that there is risk

in writing too much, where all that is wanted is to point out, as briefly and as clearly as possible, the dangers to which the soldier is exposed, and how they are to be met. There is, however, one great class of diseases which we have thought it better to omit from this essay.

We lay no claim to originality, and free use has been made of Parkes's 'Practical Hygiene' and other works.

T. H. HENDLEY.

31*st August*, 1894.

CONTENTS

PAGE

INTRODUCTION 1

THE GERM THEORY OF DISEASE 2

PUTREFACTION AND DECOMPOSITION 7

PREVENTABLE DISEASES, THEIR PROBABLE CAUSES, AND HOW THEY MAY BE PREVENTED OR MITIGATED 9

POISONS—ORGANIC AND INORGANIC—ANTIDOTES . 18

ACCIDENTS—FIRST REMEDIES 23

LOSS OF CONSCIOUSNESS; SUNSTROKE; DROWNING; AND SUFFOCATION 25

VENTILATION — THE CHEMISTRY OF AIR AND BREATHING. 26

ANATOMICAL REASONS FOR CARE OF THE YOUNG SOLDIER 31

VENOUS AND ARTERIAL HEMORRHAGE, AND HOW THEY MAY BE STOPPED 31

PAGE

FOOD 34

HOW TO JUDGE OF GOOD MEAT, BREAD, ETC.. . 34

THE STRUCTURE OF THE SKIN, AND THE REASON IT IS NECESSARY TO KEEP IT CLEAN . . . 37

CASUALTIES FROM SHOT AND SHELL INSIGNIFICANT IN COMPARISON WITH THOSE FROM SICKNESS . . 38

WHO IS RESPONSIBLE FOR SANITATION? . . . 40

HOW SANITATION IS COMMONLY NEGLECTED IN AN ORDINARY HOUSE, AND IN BARRACKS, AT HOME AND ABROAD 41

SINKS AND TRAPS EXPLAINED—EXTREME DANGER OF NOT UNDERSTANDING THEIR ACTION . . 43

INTEMPERANCE THE SHORTEST ROAD TO THE GRAVE IN INDIA 47

A FEW WORDS OF CAUTION TO TOTAL ABSTAINERS 50

THE REASON A CHILL IS DANGEROUS . . . 51

NECESSITY FOR EXERCISE EXPLAINED . . . 52

THE REASON HEALTH IS SO NOTORIOUSLY NEGLECTED 53

THE MILITARY IMPORTANCE OF SANITATION . . 54

A FEW SANITARY RULES TO SECURE HEALTH, AND TO PRESERVE AND PROLONG LIFE . . . 56

SANITATION AND HEALTH.

INTRODUCTION.

Even an elementary knowledge of sanitation saves many lives and much suffering. People contract sickness, frequently with fatal results, as a consequence of the ignorance and carelessness of their neighbours, it is therefore the duty of every individual in the community to pay strict attention to the simple rules of health.

Few people in India trouble themselves to insist upon the cleanliness of their kitchens, which with their surroundings are frequently the filthiest spots in a cantonment, and hotbeds of disease. Some people do not hesitate to say that they never visit their cookhouses, because, if they did, they would be unable to eat anything that came to table; they prefer not to be disturbed by having brought home to them the risks they run. Without strict supervision, the filth of a native butchery, or bakery, is beyond description, and yet it is easy to

remedy this evil, if people will but make an effort to overcome their indifference or fastidiousness.

If we wish to secure health and to guard against disease, we must insist upon our food being properly prepared, under conditions of cleanliness and of wholesomeness; and we must pay attention to such important matters as personal cleanliness, fresh air, pure water, out-door exercise and clean surroundings.

THE GERM THEORY OF DISEASE.

A BULKY treatise might be written on the germ theory of disease, but it is sufficient for our present purpose to state that the air we breathe and the water we drink contain millions upon millions of microscopic germs * and organisms,† both animal and vegetable. The sunbeam discloses the dust

* Germ—a seed. That from which a vegetable or animal organism springs.

† Organism—a living structure composed of different organs or parts.

floating in every direction, and shows us the way in which infection can be carried about in the air.

Many of these germs and organisms are harmless, but others are at the root of certain diseases. In cholera, for example, the conditions are congenial to the life of a peculiar comma-shaped organism that swarms in countless myriads in the patient. Fortunately for us, the germs of dangerous diseases do not always strike us when, or where, the conditions are favourable to their reproduction, and that is why several people may be exposed to the same infection, but they do not all take the disease. The reason we do not expect to get scarlet fever more than once is due to the fact that the special constituents of the body which favour the development of the disease have been already destroyed by the fever-germs, or rendered uninhabitable, and the other parts of the body do not offer suitable nourishment to that particular germ. Old people are less susceptible to enteric fever than the young.

It is a recognised fact that the germs of disease reach us through the medium of air and water. Impure water is perhaps the most fruitful source of disease. We can also be infected by food that has absorbed the disease poisons, which are generally supposed to be living organisms. These little creatures get into our blood, or into our tissues, multiply in countless myriads, and so, either from their move-

ments or from their products, we become more or less ill with the disease that is connected with the particular organism that has made our body its home.

Germs of many kinds rain down upon us at all times, but we do not, as already stated, necessarily take disease, because it is essential that a particular poison should be absorbed by a susceptible subject, and that the germs or organisms should penetrate some weak spot in our armour.

Doctors wash their hands and change their clothes after visiting cases of infectious sickness, to avoid the possibility of conveying infection.

The lungs are a perfect filter ; and probably in a healthy person the violent chemical action, which is always purifying the blood in the lungs, may destroy any poison that enters with the air. Professor Tyndall proved by experiment that the residual air, which is the air not driven out from the smallest air tubes in the lungs by forced expiration, contains no dust. This proves that all solid particles floated into the lungs by the atmosphere are retained by the larger air tubes. If a man is wounded internally, there is little danger of putrefaction so long as the external air is excluded from the wound. The air which passes through the lungs can come in contact with the internal surface of the wound without injury, because the lungs filter out all the

impurities which are floating in the air. But if we allow the external air free access to a wound, the germs or organisms, which are floating in the air, may become absorbed from the raw surface, germinate, flourish, multiply and produce festering sores. Consequently an external wound should be cleaned, antiseptics * applied, and then covered with cotton-wool and bandages. Tyndall proved that a layer of pure cotton wool will keep out all germs.

If milk, drinking water and food are exposed to contact with impure air they may absorb dangerous germs of disease. Consequently, it is dangerous for a soldier who is watching a sick comrade to eat or drink anything that is left, if the sickness is of a catching nature.

Some people consider that all specific diseases can be explained by the germ theory. All are agreed that disease may reach us through the medium of air, water and food.

The heat of cooking destroys a vast number of germs and organisms, and renders harmless organic matter † that is approaching the poisonous state.

There are certain diseases which may lie quiet in the body for years, and then suddenly develop. This is notably the case in hereditary

* Antiseptics—substances which prevent, or retard, putrefaction.

† Organic matter—matter which proceeds from animal or from vegetable organisms.

ailments.* We also know that some germs retain unimpaired their powers of conveying disease for long periods after leaving the body; for example, the germs of scarlet fever on wall-paper, on letter paper, on bank notes, or on clothes that have not been used for months.

"It is now evident that the competency of dirt as an insanitary influence depends almost entirely upon its affording a place of increase, or at least of shelter, to innumerable minute organisms, which appear, in the present state of knowledge, to be themselves the active causes of disease." †

Fresh air, sunlight and cleanliness are most destructive to the germs of disease.

* Hereditary ailments—those diseases which descend from parent to child.

† 'The Times,' September 11, 1894.

PUTREFACTION AND DECOMPOSITION.

PUTREFACTION is a "natural process by which animal and vegetable bodies are disorganised or decomposed and their elements newly arranged." Poisonous gases are also given off, and this disturbance has a powerful and injurious effect upon our living bodies. Putrefaction is accompanied by the presence of and is produced by minute organisms.

In a hot country "the temperature and dampness of the air are highly favourable to decomposition of all kinds," and there is much poisonous effluvium * from impure soils. But pure soil has a wonderful power of purifying what is put into it; at a depth of twelve feet, more or less, germs or bacteria † are found not to exist. The earth acts as a filter, so that water taken from deep springs is free from organisms, but when it is taken out and exposed to the air it soon teems with them, though they may not always be injurious. Freshly turned up soil is often very dangerous. Earthworms bring to the surface from decomposing bodies the bacilli ‡ of

* Effluvium—minute particles that flow out and are perceived by the sense of smell.

† Bacteria — minute vegetable organisms found in decaying matter; they increase with great rapidity. The smallest organisms which are seen under the microscope.

‡ Bacilli—a variety of bacteria; small rod-like organisms.

consumption and of other diseases. If horses or cattle eat the grass that grows on the graves of animals that have died of certain diseases, they are liable to contract the disease.

Captain Hayes writes that "the anthrax * germ exists as a kind of fungus on certain pastures, and communicates the disease to animals which graze on, or are fed from, these infected lands." "Flies play a large part in the distribution of the anthrax disease," and probably of many other diseases.

Fluids possess the property of absorbing noxious gases. Water absorbs about three times its volume of sulphuretted hydrogen—recognised by the odour of rotten eggs—a deadly poison and a constant product of decay. Fluids used for drinking purposes are often polluted by absorption, and none more so than milk, which is a suitable medium for the absorption and the growth of germs. In this way scarlet and enteric fevers are spread by milk. This pollution by absorption is quite apart from direct defilement by mixture with poisonous substances, whether solid or fluid.

* Anthrax—a very catching disease of horses, cattle and sheep.

PREVENTABLE DISEASES, THEIR PROBABLE CAUSES, AND HOW THEY MAY BE PREVENTED OR MITIGATED.

SMALL-POX.

PREVENTABLE diseases may be headed by small-pox, which, says Dr. Parkes, is perhaps the most horrible of all diseases. In severe cases a thick crust disfigures the face and head, and the patient is unrecognisable with swollen and distorted features : the eyes closed and half glued by matter, the mouth open, swollen and dribbling, the hands nerveless and swollen. Perhaps, except bad leprosy, there is no more loathsome sight. "Many were killed outright; of the survivors, many were disfigured and injured, some by loss of sight or hearing, some by paralysis, severe abscesses, or diseases of the bones, and in all there was horrible scarring, usually in the face."

In the last century, small-pox was the constant terror of all England—it still exists—but we no longer dread it, because vaccination has mitigated its severity. In our own and in foreign armies, where it used to be a constant scourge, it is now almost unknown. Medical men and attendants on the

sick in small-pox hospitals no longer fear it, for they are protected by vaccination; and when a case of small-pox does occur amongst us, it is at once isolated, and the disease stamped out without causing general alarm.

When we recollect that the discovery of the circulation of the blood is of comparatively * modern date, and that enteric fever a few years ago was not distinguished from typhus fever, we can realise how slowly we have emerged from the dark ages of ignorance, and may anticipate that the future will see other formidable scourges of mankind, besides small-pox, brought within bounds and under our control.

SCARLET FEVER.

Scarlet fever is not feared in India because the conditions of climate are not favourable to its development, but it is a serious disease in England. The scurf which comes off the skin floats in the air, and conveys the disease either through the lungs or through the medium of food that has absorbed the poison. Milk readily takes up this poison, but in some cases it is the impure water adulterating the milk that is responsible for the mischief. The pre-

* Harvey, 1628.

cautions in scarlet fever, as in all infectious diseases, are the isolation of the patient and the free use of disinfectants. Scarlet fever is very slightly infectious before the appearance of the rash.

DIPHTHERIA.*

As an example of the way these preventable diseases are contracted, a few years ago several people in a small town died of diphtheria, and it was ascertained that they had all dealt at the same dairy. This dairy was examined, and it was found that the milk cans were washed at a sink in the room where the milk was kept standing. The sink was found to be in direct communication with the sewer; and so are thousands of other sinks that lead from the sculleries and baths of our own houses.

TYPHOID, GASTRIC, OR ENTERIC FEVER.

Enteric fever† is one of the most prevalent of the preventable diseases, and we now know that the germs are swallowed in water or food.

* Diphtheria—a very dangerous contagious disease, in which the air passages, and especially the throat, become coated with a substance resembling chamois leather.

† Enteric—intestinal, or relating to the bowels.

Enteric fever germs are present in the discharges from enteric patients, and spread infection by finding their way into the water or food supply. Hence the importance of disinfectants. It is also possible that mild cases of enteric fever never find their way into hospital, and in this way the disease may be spread, and spread in a severe form.

The natives of India foul all the sources of water supply; and the water of their streams and wells is frequently little better than diluted sewage, swarming with organisms and germs of the most dangerous kinds. In India all drinking water should be boiled: tea is a safe drink. It has been quite recently stated officially that enteric fever has been almost entirely stamped out among the French troops in Algeria by boiling all the water used for drinking purposes.

Bright sparkling spring water is not always pure; it may be contaminated by foul gases and sewage, especially in the hills where the collecting ground is generally coated with a mass of decomposing organic matter.

The lemonade and aerated waters of the bazaars are frequently made with impure water and put into dirty bottles with rotten corks. It is now stated that soda water that has been bottled for a week is quite free from germs.

DIARRHŒA.

Diarrhœa is very prevalent and should not be neglected. It may be caused by impure water, by impure air, by unwholesome food, by exposure to cold and wet, and in other ways. The residents of a village may drink the foul water of their wells, or tanks, without any apparent or immediate harm, but a fresh comer may find it a deadly poison.

Where diarrhœa prevails it is wise to wear a warm belt round the abdomen, to eat only fresh food, and especially to avoid all unripe and decayed fruit. If the feet get wet or the body chilled, every effort should be made to restore the vigour of the circulation by taking a warm bath, by friction of the trunk and limbs, exercise, dry clothing and hot drinks.

Sometimes changes occur in the food itself which make it extremely poisonous, resulting in bad diarrhœa, vomiting and great exhaustion. This often happens with meat pies which have been reheated and then eaten cold; with certain fish, and especially with shell-fish. In very hot weather these things should be avoided. Tinned provisions bought in the bazaar are frequently stale, and consequently dangerous. It is useful to remember that when the top of a tin is "bulged out" it is due to the pressure of the gases produced by the decomposition of the contents.

DYSENTERY.

Dysentery is due, in hot climates, to causes similar to those which produce diarrhœa in cold latitudes. Early medical advice is very necessary in this disease. If no medical man is at hand, a tablespoonful of castor oil should be given with 15 drops of laudanum, and three hours afterwards one grain of opium in pill, followed by 30 grains of powder of ipecacuanha.

CHOLERA.

When cholera breaks out, the surroundings should be thoroughly cleaned and disinfectants used freely. It is practically certain that water is the principal medium in conveying the contagion, therefore, *boil the water.* If the stomach lacks its normal acidity a man is very liable to contract cholera, and drunkenness has a marked effect in neutralising this acidity. For the same reason Epsom salts and other saline purgatives are bad.

MEASLES.

Measles are infectious, usually mild, but may prove a severe and fatal disease, especially when complicated with lung affections.

MALARIAL FEVER AND AGUE.

Malaria requires three conditions:

(1) A comparatively high temperature.
(2) Exposure of surface.
(3) Moisture.

The importance of studying malarial fever is now realised, because in some parts of the globe it is the cause of two-thirds of the mortality. "Fevers of malarial origin destroy more than small-pox, cholera, and all other epidemic causes put together." Dr. Parkes observed that "when a climate is called unhealthy it is simply meant that it is malarious." Malaria is said not to exist above 3000 feet of elevation; however, if the poison is in the system, we may suffer at any elevation. These fevers are certainly not directly infectious either by contact or through the air. When lakes or ponds have been drained, the exposed surface has produced malaria which has disappeared on reflooding the ground. Sometimes the malarious surface is rendered harmless by being covered with pavements and buildings.

Ague is a form of malarial fever in which there is a complete intermission of the disease; in other

words the fever occurs at intervals, but completely subsides before the next attack.

In the worst malarial fevers there is a remission only, not an intermission; that is to say, the fever never entirely disappears, although it is usually less severe in the morning.

Ague is associated with enlarged spleen, which sometimes becomes so huge as to fill the greater part of the abdomen; and in bad cases the organ may never return to its proper size. A blow over the spleen, or even great excitement, may be followed by rupture of the organ and death; hence the danger of striking natives in India, for it is a common thing for the natives to have enlarged spleens.

Malarial poison, where it exists, is absorbed more freely in the early morning and late in the evening. Hot coffee with a biscuit is generally given before an early march, because it is well known that it is unwise, in a hot climate, to go out before the sun is up unless we give the stomach something to do. In a malarious climate, like the Gold Coast of Africa, or the Terai of India, it is desirable to take a regular morning dose of about three grains of quinine.

Chills must be avoided. After taking exercise, especially in the evening, an overcoat should be put on. On reaching home, all damp clothes should be removed and the body well rubbed.

In all malarial fevers every inducement should be made to cause perspiration, by heaping on blankets, by sipping warm drinks, and, in severe cases, by taking Warburg's tincture or some such medicine. When the temperature falls is the time to take a large dose of quinine.

SPOTTED TYPHUS.

Spotted typhus was formerly very prevalent in the army and among ill-fed and crowded populations; but it has been removed by better ventilation, greater cleanliness, and more frequent washing of wearing apparel. This disease is only mentioned to show what can be done by attention to sanitation.

THE PLAGUE AND SWEATING SICKNESS.

The state of dirt and utter filth in which our ancestors lived seems almost incredible. Under similar conditions to what formerly existed in England, typhus fever still prevails amongst the native population of the Northern Punjab; and recently the plague appeared in Bombay and in other centres of population where insufficient attention had been paid to sanitation. "Mahamari," a disease similar in character, slew whole villages in Northern India some time ago.

SICKNESS GENERALLY.

Sickness generally may be prevented in India by attention to the well known precautions against the bad effects of the climate which have already been mentioned, or will be mentioned. Cooking-pots must be regularly tinned and inspected, as the native cooks usually keep them in a filthy state if they are not supervised. The tin is often adulterated with lead.

POISONS—ORGANIC AND INORGANIC—ANTIDOTES.*

Not only may we have to administer first help in cases of accidental or malicious poisoning, but also in cases of attempted suicide.

Poisons have been divided into three classes:

(*a*) Those that destroy the tissues and produce nervous shock.

(*b*) Narcotics that produce insensibility by action on the brain.

(*c*) Those poisons that combine the actions of *a* and *b*.

* Organic—that which proceeds from animal or from vegetable organisms.

In all cases of poisoning send for a medical man at once, but, as delay may be fatal, commence to treat the patient according to the following directions:

1. Except in case of acrid poisons, encourage vomiting.

2. Counteract effects by antidotes which, by acting mechanically or chemically, render the poison harmless.

3. Remedy the effects, and obviate the tendency to death by stimulants, artificial respiration, &c.

Except in cases of poisoning by strong acids, the physician will generally empty and wash out the stomach by means of the stomach pump.

If the poison is an acid, the antidote is an alkali. The principal strong acids taken as poisons are: vitriol or sulphuric acid; aqua fortis or nitric acid; spirit of salt or hydrochloric acid; oxalic acid in the salt of sorrel.

The most handy antidotes for acid poisoning are soda, potash, magnesia diluted with water, limewater, chalk or whiting, the plaster from the walls or ceilings, milk or soap-suds. We must not forget that in all cases of poisoning, the first remedy at hand is the best; *there is no time to be lost.*

If the poison is an alkali, the antidote is an acid. The chief alkalies that may be taken as poisons are caustic potash and solution of carbonate of ammonia.

The most suitable antidotes for alkaline poisoning are vinegar, other dilute acids, lime juice and water, lemons, oranges and fruit. These should be followed by soothing drinks, such as linseed tea, which may be flavoured with lemons or oranges, if at hand; and ice should be given if there is inflammation.

*When the poison is an irritant,** such as arsenic, tartar emetic and mercury, we should give oil, white of egg, milk, flour and water, or fat. In the case of *phosphorus or rat poison,* avoid oils and fats.†

For narcotic ‡ *poisoning,* emetics, strong coffee, fresh air, cold douche, forced exercise, smelling salts. In cases of opium poisoning, give Condy's fluid freely diluted, and keep the patient awake.

For alcoholic poisoning, emetics and castor oil. Warmth to surface of the body, a little vinegar and water and cold affusions. In a case of supposed intoxication, put the man in the fresh air in the shade, loosen all clothes, especially about the neck, and clean the mouth. The cold douche or affusion is simply pouring water on the head or spine from a height. In very bad cases rouse the patient by

* Irritant—a substance which irritates, excites or causes inflammation.

† Matches should not be left within reach of young children, because they are liable to suck them.

‡ Narcotic—a drug which relieves pain, produces sleep, but in large doses stupor, and even death.

making him walk, and flap him with a wet towel. Give hot coffee as soon as possible.

Sometimes, even when drunk, a man may be suffering from apoplexy, or his skull may have been fractured. This should be remembered. In ordinary cases of drunkenness the cold douche and an emetic will be enough. It must not be forgotten that when a man is very drunk indeed, although he has degraded himself, he requires careful treatment, as it is quite possible he may die.

The following are the emetics most likely to be at hand.

Mustard.—A table-spoonful in half a pint of water, followed by plenty of lukewarm water. Putting the fingers into the throat will make most people vomit, especially if preceded by copious draughts of tepid water.

Common salt.—Two table-spoonfuls in half a pint of warm water.

Gunpowder.—A small handful mixed in a half pint of lukewarm water. Sometimes the emetics will have to be repeated. It is occasionally very difficult to produce vomiting.

Tobacco poisoning. — Emetics, stimulants and strong tea.

Gas poisoning. — Sometimes men become insensible when they go into wells, pits, holds of vessels and caves. No one should follow them

without being tied to a rope. The poison is usually carbonic acid gas, which may be proved by a light being extinguished. The man who is insensible should be exposed to the air, and artificial respiration * should be tried.

Stings.—The simplest remedy is the juice of a raw onion. Suck the wound, and if possible apply strong ammonia, eau de cologne, or an alkali, such as carbonate of soda.

Snake bites.—Tie a string tightly, where possible, between the bite and the heart, suck the wound,† scrape the edges with a pen-knife, apply caustic, or carbolic acid, give brandy and strong coffee to drink, and prevent sleep by every possible means. Burning is not so effective as caustic, but a good remedy is to place some gunpowder in the wound and light it. If the bite is certainly from a deadly snake, it would be necessary to cut out the place without a second's hesitation. If the finger has been bitten by a dangerous snake, it would be wise to cut it off at once and then fasten a cord round the stump.

Bites from mad dogs.—Wash the wound at once, but *it must not be sucked.* Burn the part with a hot iron or heated charcoal, or apply caustic, or carbolic acid, and if the dog is really mad, start for a Pasteur

* Artificial respiration—the imitation of the natural act of respiring or breathing, which is best learnt at an ambulance class.

† Assuming you have no cuts on your own lips.

institute without delay. Do not kill the dog until it is proved that he is mad. Even when the bite is not from a mad animal, it should be thoroughly washed and caustic applied.

ACCIDENTS. FIRST REMEDIES.

Burns and Scalds.—Apply common oil, or what is called Carron oil, which is made by shaking together oil and lime water in equal parts. Lime water is made by mixing slaked lime with water, and letting it stand. Flour is very useful by keeping out the air.

Carbonate of soda and cotton wool may also be used to exclude the air. Oil is very necessary if the skin is broken, and the pain is much less when air is excluded. The reason a large burn or a scald is so dangerous is due to the fact that the skin is destroyed, and the action of the skin is necessary to our existence, as will be explained further on. In the case of a severe burn, the clothing should be cut and not torn off, or the wound will be aggravated and great pain caused.

Fractures and Broken Bones.—Be very careful in

lifting anyone whose bones are broken. Place the sufferer, if his leg is broken, on a flat board or a door, and carry him to the hospital. If the limb is roughly handled the bones may pierce the skin in a simple fracture, and convert the wound into what is called a compound fracture, which is far more dangerous.

Before moving the broken limb, splints should be applied. Temporary splints may be thin boards, one or more walking sticks, folded newspapers, fire-irons, umbrellas, rifles, sword scabbards, &c. They may be padded with wool, cotton, or pieces of clothing, and tied round with pocket handkerchiefs, string, strips of linen, &c. A large bandage outside of all will protect the wound from any chance injury on the way home. If the arm is broken a sling must be extemporised.

In many cases long boots should not be removed until the patient is in bed, as they might act as splints; but in any case clothes and boots must be cut, and not pulled off if the injury is likely to be aggravated. If there is an open wound where the bone is broken, dip a clean rag in the blood and put it over the place which is injured.

Sprain.—Immediately it happens apply cold—ice if possible—and when swelling has taken place, heat.

LOSS OF CONSCIOUSNESS; SUNSTROKE; DROWNING; AND SUFFOCATION.

Loss of Consciousness may be caused by injuries, diseases of the brain, such as apoplexy, or epilepsy, poisoning, fainting from loss of blood, shock, weakness, want of air or food, or want of blood in the head. The first treatment is to loosen tight clothing, especially round the neck, to give plenty of fresh air and to place the head low if the face is pale. "If the face is red the head must be raised. If there is vomiting the head should be turned on one side."

Sunstroke or Heat Apoplexy is very common where the heat is extreme, and the air is very dry or still. The patient falls suddenly and is generally insensible. The face is red and sometimes there are convulsive twitchings of the limbs. The head and upper part of the body should be raised, and cold water poured from a height of a few feet on the back of the head, neck and chest; wrap the naked body in iced sheets. The sufferer should be fanned and ice placed on his head. *Avoid stimulants.* The disease usually occurs in hard drinkers.

Less severe cases or heat faintings are known by paleness of the face, giddiness, indistinctness of sight and fainting, usually with a rise of temperature.

The treatment is cold bathing, cold douche, and iced drinks.

Prevention of Sunstroke.—Wear a suitable protection for the head and, if exposed to much sun, dark glasses, and a pad of cotton wool down the back; strong drinks must be avoided. The hot sun on the spine is very dangerous. Soldiers' children are too often insufficiently protected against the sun.

Drowning.—It would take up too much space in this little book to give the Humane Society's directions for resuscitating the apparently drowned, but every one should make it his business to know something of the treatment. It is sufficient to say that breathing must be restored before any steps are taken to warm the body.

Suffocation.—Similar treatment to the case of drowning, whether the suffocation proceeds from hanging, bad air, or opium poisoning.

VENTILATION, THE CHEMISTRY OF AIR AND BREATHING.

It was found, some years ago, that the mortality among the Guards was three times that of the civil population; in the rest of the army it varied from

one and a half to two and a half times. A careful and exhaustive enquiry established the fact that the great mortality was principally the result of overcrowding and insufficient ventilation.

Roughly speaking, the air we breathe is a mixture of two gases, $\frac{1}{5}$ of oxygen to $\frac{4}{5}$ of nitrogen by volume. In addition to oxygen and nitrogen, there are usually present aqueous vapour and traces of other gases; and we have only to look at a sunbeam to realise how much matter is in mechanical suspension in the lower strata of the atmosphere.

The cubic space for each adult should be about 600 cubic feet, and he requires 3000 cubic feet of fresh air per hour. The 600 cubic feet of air must therefore be changed five times in the hour. In cold climates, however, if the air is changed more than three times in the hour, unless it is warmed, draughts are caused, which are uncomfortable and even dangerous.

The lungs have many millions of small air cells, giving about 20 square feet of surface. The air is taken into the lungs, and the oxygen comes into direct contact with the minute blood vessels in the air cells, and oxidises the carbon * in the impure

* To oxidise means "to convert into an oxide by combination with oxygen." Carbon is an elementary substance which is present in all organic compounds: coke and charcoal are principally composed of carbon. To oxidise the carbon in the blood means to add oxygen to it so that it may be oxidised into a gas and removed from the blood, which is thus purified for the purpose of conveying nourishment to the various parts of the body.

blood, takes the carbon out of the blood, and the lungs exhale* it as a gas. This gas is called carbonic acid, and is a poison to animals but not to vegetation, which, acting in a similar way to the lungs, extracts carbon to form woody growth and gives back the oxygen to the air. Consequently the great parks with their trees are sometimes spoken of as the lungs, or purifiers, of the air of large cities.

Air becomes impure by respiration,† and the exhalation gives off carbonic acid,‡ carbonic oxide,§ organic matter and aqueous vapour. An adult gives off 6 to 8 cubic feet of carbonic acid gas in 12 hours.

To prove the presence of carbonic acid in your breath, take lime water, force pure air through it and there is no result; but breathe through it by means of a pipe and it becomes milky white, which is due to the formation of carbonate of lime.

If 1½ to 2 per cent. by volume of carbonic acid exists in a room, many people suffer from severe headache, and this is often the case in theatres or

* Exhalation—the act or process of exhaling or sending forth fluids in the form of steam or vapour.

† Respiration—"the act of breathing; the act of inhaling air into the lungs, and again exhaling or expelling it, by which animal life is supported."

‡ Carbonic acid—a colourless heavy gas which extinguishes flame and destroys life; also called carbonic dioxide or choke damp.

§ Carbonic oxide—a very deadly gas composed of carbon and oxygen. It contains more carbon than carbonic acid.

crowded rooms. If there is 5 to 10 per cent. of carbonic acid we have fatal results; 16 per cent. will extinguish a candle.

Less than ½ per cent. by volume of carbonic oxide produces poisonous symptoms. Carbonic oxide exists in coal gas, and it is produced by the combustion of charcoal and coke. It is the blue flame which is often seen on the surface of a red hot coal fire, and it exists in large quantities in black smoke.

An ordinary candle consumes about as much oxygen as one man. A gas burner about twice the quantity.* The exhalations from our skin are considerable, and they also taint or poison the air.

The mean movement of the air in England is 6 to 12 miles an hour; at Aldershot it is 12½ miles; 1 mile an hour is not perceptible; 2 miles an hour is hardly perceptible at 55° to 60° F.; at 3½ miles an hour a draught is felt.

Places of assembly are often packed very close, and insufficiently ventilated; but as we do not remain there very long, the injurious effects are not always apparent.

Where men are buried alive, the fatal effects are probably due to poisonous gases of exhalation

* The injurious products from gas burners should be removed by ventilation in all public buildings, churches, &c., and in private houses wherever possible.

as well as to want of oxygen. The symptoms are not those of pure asphyxia.* If they survive they have fever for three or four days, boils, &c.

In the family quarters in barracks, the air space is fixed at the minimum,† therefore parents should see that the air is renewed at least four to five times in the hour. It is a common but most foolish practice to fill up or close the ventilating apertures. Breathing tainted air is injurious to health.

It is not yet sufficiently recognised that the impurities given off to the air by animals must be removed like ordinary sewage. The systems of ventilation are numerous and easily understood, and are based on the principle that warm air rises. The difficulty is to avoid draughts. The air in a room should have no perceptible taint. Avoid draughts which cause chills, but do not be afraid of too much fresh air. However, there can be no efficient ventilation in cold climates without some system of warming.

It is hoped that the extreme importance of fresh air has been proved, but more will be said later on.

* Asphyxia—apparent death or suspended animation, when the breath is stopped or interrupted in suffocation, drowning, &c.

† Minimum, or least.

ANATOMICAL REASONS FOR CARE OF THE YOUNG SOLDIER.

MANY parts of our bones are not grown, united or consolidated till we are 23 years of age, and in some cases not until we are 25 or even 30.

The heart is not matured until we are 25. Young men below 25 should therefore be especially careful not to overstrain themselves. From about 14 till the completion of growth is a critical time, because the nerves, muscles and bones are immature.

Many a feeble young fellow, by enlisting, and getting good food, develops into a fine man.

The old are far less susceptible to disease than the young.

VENOUS AND ARTERIAL HEMORRHAGE, AND HOW THEY MAY BE STOPPED.

THE heart is hollow and divided into a right and a left half, and each half has two chambers communicating by a valvular orifice.

"The right side receives the venous blood, and

drives it to the lungs to be purified and returned to the left side of the heart. The left side receives the arterial blood and forces it through the arteries to every region of the body."

This arterial blood, pure at starting, becomes impure by the time it has done its work, and it returns through the veins to the right side of the heart.

In arterial hemorrhage the blood spurts out with great force in jets, and is bright red.

In venous bleeding the blood flows slowly in a steady stream, and is of a dark purple colour.

"Pressure is the most powerful means of arresting external hemorrhage," therefore press the injured vessel against some bone if possible.

Another method is to stuff up the wound temporarily with a piece of dry, clean cloth, and to apply direct pressure upon it.

With arterial bleeding no time should be lost. Elevate the limb, but place the body lying down. Apply pressure to the main artery on the heart side of the bleeding point, with the fingers, or a pad and bandage, and stop the flow of blood by means of a tourniquet; also press the fingers directly over the wound of the bleeding vessel till you can get assistance. After the tourniquet is securely fixed, apply a pad and bandage over the wound itself as an additional safeguard.

The pressure should be continued until the artery

has been tied by a surgeon. The pressure is produced by a tourniquet, which may be formed by tying a handkerchief and twisting it by means of a stick thrust underneath. A round stone or hard smooth pad should be placed upon the artery and pressed down by means of the tourniquet.

With venous bleeding you must remember that the direction of the flow is towards the heart, and if there is no arterial hemorrhage you should remove any obstruction to the circulation on the side nearest the heart, raise the limb and apply a pad and bandage. The arteries are on the inside of the limbs, and the direction of the flow is from the heart.

In a case of internal hemorrhage, for example when a man is shot in the body, avoid alcohol, as it increases the action of the heart. Tight garters below the knee greatly obstruct the flow of venous blood back to the heart, and are liable to produce varicose veins.

FOOD.

No person can be healthy without good air, cleanliness, pure water, outdoor exercise and wholesome food. Everyone knows what wholesome food means, and yet many people eat what they know perfectly well is not wholesome food. The worst place to shoot rubbish is the stomach. The food is to the stomach what fuel is to the steam engine.

Milk is absolutely necessary for children. Tinned milk is very wholesome. When milk is scarce, cheese is a good substitute.

Bad pork causes vomiting and purging like cholera, and gives rise to tape-worm. It is better to avoid all native pork. Consider the habits of the Indian pig, and what a foul feeder he is: he devours the excrement round the villages. It is positively dangerous to eat his flesh.

HOW TO JUDGE OF GOOD MEAT, BREAD, ETC.

MEAT is best judged by its taste when cooked, but we ought to know enough about it to give an opinion upon it while it is raw. The animal ought before it is killed to have fat on its ribs, flesh firm and elastic,

skin supple, eyes bright, the membrane which lines the nose should be red and moist, no running from the nose, respiration regular, coat neither rough nor staring, tongue not protruding.

Meat should not have more than 20 per cent. of bone. The fat should be sufficient but not excessive; it should be firm and healthy looking.

It is said that butchers will rub melted fat over the carcasses of thin and diseased animals, in order to give the glossy look of health. Another nasty butcher's trick is to make a hole in the skin and blow it out, so as to cause the carcass of a lean animal to appear well nourished.

Raw meat should be firm, elastic and of fine grain, and little veins of fat should give it a marbled appearance. The colour should be bright crimson if possible. The meat in India is usually paler than in England. Place good meat on a white plate and a little reddish juice flows out after some hours.

There should be no unpleasant odour. Push a knife in, when the meat is good the resistance is uniform, and there is no smell on the knife. The marrow should be a light rosy red; if it is soft, brownish, or with black points, the animal was sick or putrefaction is commencing. A deep purple tint is said to indicate that the animal was not slaughtered but died with the blood in it.

Never allow the feet or tails to be cut off mutton,

or you will be given goat's flesh. Ram mutton has a rank smell.

With regard to bread, the adulterations are the flour of inferior grains, potatoes, rice, alum, clay, &c. &c.

In examining flour, smell it, look for mould and weevils. Bread is weighed when fresh, therefore allow for a loss of at least 4 per cent.

The external surface of a loaf should be well baked, not burnt. The crumb should have regular cavities, no part being without them.

The partitions between cavities should not be tough. The colour should be white, and the taste not acid. Excess of alum is injurious, but is not likely to be found in Indian commissariat bread.

To test milk, dip a spoon into it, and the milk ought to adhere; the taste is a guide, and the proportion of cream. There should be no unpleasant odour. Unless cowsheds and dairies are under rigorous control, the only safeguard against the spread of disease through milk is to boil it.

Tea is tested by the smell and taste; and by the appearance of the leaves after the tea has been made.

The quality of the rations is approved by the regimental officers, the quarter-master being responsible for quantity only. In these days officers have opportunities to learn how to judge of the rations for the men and for the horses.

THE STRUCTURE OF THE SKIN AND THE REASON IT IS NECESSARY TO KEEP IT CLEAN.

THE skin contains millions of little glands, and its action vitiates the air, in a similar manner to the lungs, by giving off impurities which consist of much vapour of water, organic matter and carbonic acid.

The blood is purified by the action of the skin as well as by the lungs. If a man were to be encased in air-proof material, too much work would be thrown on the lungs and he would soon die.

Tattooing destroys the pores of the skin, and if overdone may be fatal. "The skin is not merely an organ of touch, it is a breathing organ." A dirty fellow is credited with having said that there was no use washing because he got dirty again; but unless the skin is well washed and rubbed, there is decomposition of the perspiration and of the scales from the cuticle, hence the unpleasant odour of the "great unwashed" which makes a clean man feel positively sick.

CASUALTIES FROM SHOT AND SHELL INSIGNIFICANT IN COMPARISON WITH THOSE FROM SICKNESS.

WOUNDED men require an immense volume of fresh air, otherwise gangrene, erysipelas and other diseases very soon rage in the hospitals. In the Franco-German war it was found that the wounded in open sheds, exposed to frost and snow, did far better than their comrades who were crowded into churches or other buildings. There is an immense quantity of organic matter in the air of a hospital which contains wounded men.

The *Lancet* stated that 401,000 soldiers of the different armies succumbed during the short Crimean campaign, and out of these only 30,000 were actually killed in battle, and about an equal number died from their wounds.

At the siege of Sebastopol, the mortality among the British troops in hospital was appalling, but directly we attended to sanitation and introduced proper drainage, hutting, good food, &c., the mortality declined rapidly. The leading spirit was a lady nurse, and the whole army was moved with affection and enthusiasm for her—her name was Miss Nightingale.

Referring to the effect of the visit of the Sanitary

Commissioners to our Mediterranean hospitals, Kinglake states:—"Then came on a change which, if only it had been preceded by mummery instead of ventilation and drainage and pure water supply, would have easily passed for a miracle. Down went the rate of mortality. Having already gone down from the terrible February rate of 42 per cent. to 31; it descended in the next fortnight to 14; in the next 20 days to 10; in the next to 5; in the next to 4; and finally, in the next 20 days—days ending on the 30th of June 1855—to scarce more than 2, a rate so low as to be touching the very goal for which sanguine toilers were striving, because brought down to a level with the rate of mortality in our military hospitals at home."

If policemen attend ambulance classes for the benefit of others, soldiers might also be given the opportunity of going through a short course of instruction in "First Help in Accidents." No officer should neglect the opportunity of attending an ambulance class.

WHO IS RESPONSIBLE FOR SANITATION?

THE Queen's regulations lay down:—

"During the first week of every month the officer commanding the troops occupying a barracks—or an officer, not under the rank of captain, deputed by him—will make a general inspection of the barrack buildings, &c.

"The regimental quarter-master, or an officer acting for him, is to be present at all inspections of barracks by the officer in charge. Officers commanding squadrons, batteries and companies will attend at the inspection of their respective barrack-rooms and stables."

Officers commanding squadrons, batteries and companies "will pay great attention to the cleanliness of the men as to their persons, clothing, arms and accoutrements, and also as to the state of their barracks or quarters."

The orderly officer makes a daily inspection and report.

"A medical officer is to inspect every portion of the barracks at least once a week, and to see that they are in a proper sanitary condition. He will report to the Commanding Officer if they are not kept in a proper state of cleanliness."

There is also the medical inspection of the men,

and the periodical sanitary inspections of barracks by the Principal Medical Officers of districts and commands.

The sanitary establishments are handed over to the quarter-master. Undoubtedly this officer should receive some special instruction, or how can he be expected to know the importance of strict attention to sanitation ?

HOW SANITATION IS COMMONLY NEGLECTED IN AN ORDINARY HOUSE, AND IN BARRACKS, AT HOME AND ABROAD.

ASSUMING that the site and aspect of a house are well chosen, the first points to attend to are drainage and ventilation. There is generally too much crowding; and we see this in the houses of the rich as well as in those of the poor.

Look at an ordinary nursery, full of children, and one or more servants also sleeping in it. Servants are crowded into garrets, but garrets may be healthy enough if properly ventilated and not damp.

The cleanliness of the cistern is neglected, and as often as not the waste or overflow pipe communicates direct with the sewer. In many cisterns the sewage emanations can be seen floating on the surface, coloured like the rainbow.

The scullery sinks frequently ventilate the main drain pipe, and consequently the deadly poison called sewer gas enters the house, taints the air, and is absorbed by milk and other substances.

The wells of cottages too often have some connection with a cesspool, and precautions are not taken to exclude surface impurities. It is bad enough to find heaps of putrefying, decaying and fermenting filth in the vicinity of cottages, but it is even worse to smell an overpowering odour from the misused dust-bins in the basements of the mansions of the rich—these bins are the receptacles of filth of all kinds. In some houses the dust-bins are actually inside the house, in the sculleries.

The millionaire in his splendid room sees not the spectre of death rising from the basement, and passing quietly through the costly carpet to beckon him to his grave.

It is not that attention to sanitation is beneath our notice, but we are more or less ignorant on the subject, and *we are content to trust to others for our safety in this respect.*

The elaborate system of modern house drains is only safe when properly supervised; if neglected it is far more dangerous than the old system of open drains, because there is no deadly sewer gas in an open drain. A closed drain is always dangerous if not properly attended to. An unsound, or leaking

soil pipe may be detected by throwing down the pipe a "stink ferret," or oil of turpentine, or oil of peppermint; or by the water test, but the pipe must be closed, and water poured down.

The surface drainage is often neglected, but water should not be allowed to stagnate in the vicinity of dwellings.

The interior of the barracks is certainly clean, but soldiers often do their best to counteract all the arrangements for ventilation. Spitting on the floor is a filthy habit—it is only a foul bird that dirties its own nest.

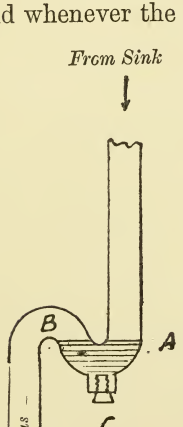
More attention is necessary in India to the sanitation of the surroundings of the barracks, especially in the hills. At home the drains and traps should receive much supervision.

SINKS AND TRAPS EXPLAINED. EXTREME DANGER FROM NOT UNDERSTANDING THEIR ACTION.

THE arrangement by which the sewer gas is shut off is called a trap. There are a great number of forms of traps, but the principle of all will be understood from the accompanying diagrams.

Figs. 1 and 2 represent a syphon sink trap; and Fig. 3 the kind of trap which receives surface water in the streets.

In each trap the water keeps back the sewer gas, and whenever the surface A B rises, as it does when



Sewer gas

FIG. 1.—LEAD SYPHON (OR S) TRAP, WITH SCREW CAP FOR CLEANSING (*Corfield*).

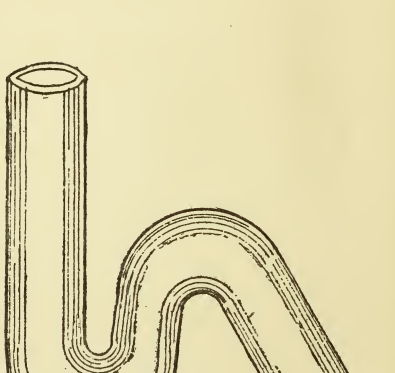


FIG. 2.—ENLARGEMENT OF SYPHON TRAP (*R.E. Institute Occasional Papers*, 1891, vol. xvii. *Capt. W. Sale, R.E.*)

water enters the trap, there is an overflow into the pipe leading to the sewer.

In sinks solid matter finds its way through the perforated plug, consequently there is a screw at C, which has occasionally to be removed in order to

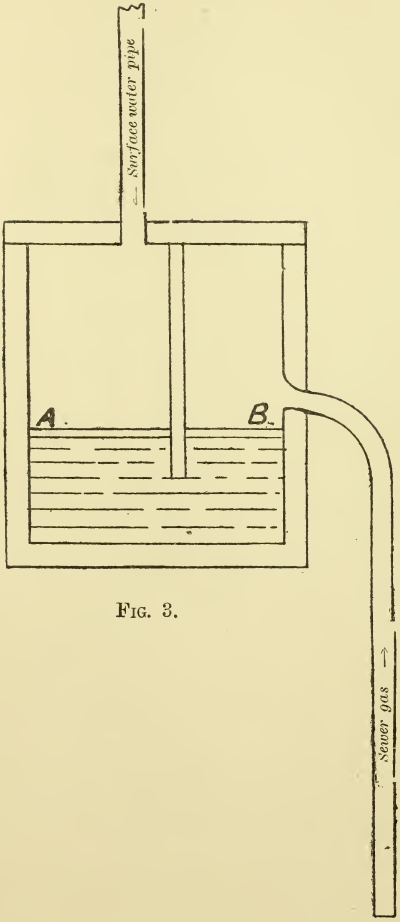


FIG. 3.

clean the syphon, or sometimes the lower bend is removable. Now there is this danger. Ignorant people constantly omit to immediately replace the screw, or if they replace it they do not pour in water to shut off the connection with the sewer.

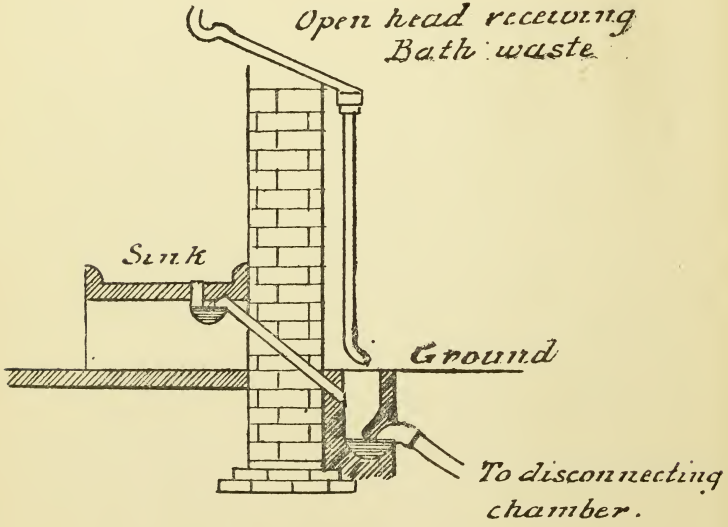


Fig. 4.—A Kitchen Sink, properly disconnected (*Medical Annual*, 1890).*

Therefore the best plan is to have all pipes entirely disconnected with the sewer, as shown in Fig. 4; and

* The arrangement would be greatly improved by making the pipe from the sink discharge itself above ground.

it is advisable to have in addition a trap to the inside pipe, which sometimes becomes foul. With regard to the street or barrack surface water trap, the trap should be frequently cleaned out, or it fills with sediment and will not act; and in dry weather water must be poured in to replace what is lost by evaporation. These matters are not always properly attended to in barracks at home. Sometimes in dry weather we notice an overpowering smell near a street trap—this is sewer gas forced up through the dry trap. The water in a trap can absorb, and then diffuse, the poisonous sewer gas; therefore all traps should be frequently flushed and ventilated.

INTEMPERANCE IS THE SHORTEST ROAD TO THE GRAVE IN INDIA.

At the present day we know that a man who does not drink has the best chance of resisting the dangers of a hot climate. The European engine drivers and guards, who are so much exposed to the sun, suffer little, but their ordinary drink is cold tea or something of that kind. If we drink beer or spirits before sunset, we lose all energy and become stupid and drowsy.

Many direct and many indirect evils are the result of intemperance. The liver, the kidneys, the heart and the brain are affected. Alcohol destroys the tissues of the body. The medicinal use of alcohol is important, and is necessary in many cases.

"A large part of the poverty and unhappiness in the world would disappear" with drink.

Sir George White ascertained that in 1893 there were eight general courts-martial held for the trial of British soldiers in India—all of them non-abstainers. Of 1,450 soldiers tried at district courts-martial only 34 were abstainers. Of 1,150 soldiers tried by regimental courts-martial only 39 were abstainers. Of the total of 2,608 courts-martial in 1893, only 73 have been held for the trial of members of the Army Temperance Association. Sir George White states:—"My experience tells me that nearly all the crime in the British Army in India is directly or indirectly traceable to drinking to excess." The admissions to hospital were about 5½ per cent. among abstainers, and 10 per cent. among non-abstainers. The figures in Sir George White's judgment, "leave a reasonable presumption that half the sickness in the British Army in India is traceable to drink."

It has been proved by experiment that alcohol lowers the temperature. Sportsmen and athletes who tax their powers of endurance avoid alcohol.

Every movement of the muscles causes a man to

do work. Including all muscular movements, if they amount to

500	tons	lifted	1 foot,	it is an extremely hard day's work.
400	„	„	„	a hard day's work.
300	„	„	„	an average day's work.

The external work of the muscles therefore varies between 300 and 500 tons lifted 1 foot.

The daily exercise should not be less that 150 tons for a healthy man, equivalent to a walk of 9 miles; but the actual walking exercise may be much reduced, because much work is done in the exertion necessary in the ordinary business of life.

The internal work of the heart, muscles, of respiration, digestion, &c. is very great; for the heart alone it has been estimated at about 124 tons lifted one foot (Haughton).

Rather less than 5 ounces of alcohol increase the daily stress upon the heart by 16 tons lifted one foot. $1\frac{1}{2}$ ounce of alcohol is the limit of moderation—say about $1\frac{1}{2}$ pints of beer containing 5 per cent. of alcohol, or $2\frac{1}{2}$ pints if there is only 3 per cent.

Moderate drinking increases the beats of the heart by 3 to 5 beats per minute for 3 hours.*

Severe exercise may augment the beats consider-

* The figures are taken from several well known authorities.

ably, but the heart compensates itself by beating more slowly afterwards. Now much alcohol would disturb this adjustment, and keep the heart beating too rapidly—in other words at high pressure.

"Spirits are dangerous unless mixed with a large quantity of water. Raw spirits act very injuriously on the lining membrane of the stomach, irritating and inflaming it. It is very desirable also to take alcoholic drinks only with meals."

A FEW WORDS OF CAUTION TO TOTAL ABSTAINERS.

Animal or vegetable matter in drinking water frequently produces disease; therefore, if there is any doubt as to its purity, boil it. A filter may cause all the diseases it is intended to prevent unless it is properly looked after.

Barley water is a palatable drink, so also is thin oatmeal and water with a little sugar.

Tea renovates the tissues, and tannin destroys animalcules in water, but strong tea must not be taken in excess, or the nerves and general health will suffer. If tea and meat are taken together, the digestion will be impaired. Both tea and coffee stimulate the nervous system, and remove the feeling

of fatigue. They are preferable under ordinary circumstances to alcoholic drinks. Cocoa is less astringent than either of them and is valuable both as a food and drink.

The directions for making tea are simple and well understood, but usually treated with contempt. For example, tea should never be boiled nor steeped too long. Temperance societies should not expect men to drink anything so nauseous as watered tea; trouble must be taken to make the tea properly or people will drink something else.

THE REASON A CHILL IS SO DANGEROUS.

During exercise the circulation is increased, the skin becomes full of blood to the very surface, and glows. The temperature of the *body*, not of the blood, would rise considerably were it not that the production and evaporation of perspiration keep it down; therefore during exercise we should wear light clothes, but immediately afterwards put on warm clothing, because the skin is very liable to cold, and a check of perspiration causes rheumatism or inflammation, which is communicated to the inner organs of the body. A chill predisposes to fever, diarrhœa, dysentery and diseases of the liver.

NECESSITY FOR EXERCISE EXPLAINED.

SUFFICIENT exercise is necessary for health; the heart, lungs, liver and skin require it; for without a healthy circulation of the blood all the organs become feeble in their action, and the digestion suffers. Sufficient outdoor exercise is essential if we are to maintain the vigour, strength and physique of our race; consequently there is much to be urged in favour of moderate hours of labour and early closing hours. Money is not everything in this world. Those who have should sympathise with those who have not, and think more of the necessities of the many than of the luxuries of the few; and then in civil life we should see more of that kindly feeling which exists in the army between the officers and their men. But there will always be rich and poor, because we can never have equality in industry, in sobriety, in thrift or in self-restraint.

Over-exertion is bad, and preliminary training is necessary before undergoing very great exertion. Thus before a campaign the men should be accustomed to more marching exercise than they usually take, and to carry their valises. In this way, too, badly fitting boots and sore feet can be detected. The best remedies for sore feet and blisters are soaping the stockings and washing the feet with a little spirit.

Walking, swimming, rowing, riding, in short athletics of all kinds, including gymnastics, are all good exercises.

The quantity of air inspired is found to be in the following scale.

Lying down	1
Walking one mile an hour, nearly ..	2
„ three miles „	3·23
„ four „ „	5
Riding and trotting	4·05
Swimming	4·33

Consequently, during exercise we absorb a much larger amount of oxygen, and eliminate a much larger quantity of carbonic acid and water.

THE REASON HEALTH IS SO NOTORIOUSLY NEGLECTED.

Health means vigour of body and mind, capacity to enjoy life and be happy, and freedom from pain. It is owing to ignorance that health is neglected. Few people understand either the construction of their bodies, or the laws of health. "In war," Napoleon said, "health is indispensable, and cannot be replaced by anything."

THE MILITARY IMPORTANCE OF SANITATION.

War strains to the utmost the powers of endurance, the capacity to bear fatigue, privations and exposure. In war the feeble suffer terribly; they are necessarily a burden to the strong; they hamper military movements, and sooner or later succumb where the strong survive.

The following extract is from *The Times* * :—

"The Commander-in-Chief very properly points out that the successful career of the individual soldier, and the efficiency of the British Army as a whole, does not depend upon men merely keeping out of the cells or the hospital ward. It depends upon powers of endurance, steadiness of nerve and a high standard of physique and morale, to which any excess in drinking is absolutely fatal in India. Sir George White confesses that he 'was so astonished' by the returns showing intemperance as the main cause of failure in the British soldier, that he thought it his duty to order and carry out a special investigation of the regimental statistics. The result has been to confirm their accuracy, and we cannot do better than conclude with the eloquent appeal which Sir George makes to the British Army

* 31st July, 1894.

under his command:—'What is a soldier without health and power of endurance? He is a fraud. He is being educated and paid, not for parade purposes in time of peace—for a soldier in peace is like a chimney in summer—but for a sterner occasion, which, if it occurs during his service, he will be found unfit to cope with. I make no reference here to the, I am sorry to say, many who from the effects of climate or other causes beyond their own control become invalids or are sickly. They deserve every respect, help and sympathy from us. But what of those others who from want of self-discipline render themselves unfit to fulfil the contract they have entered into with their country? They are false to themselves, for they betray the highest trust reposed in man, the preservation of his manhood, and they are false to the country for which they have volunteered to fight, because they render themselves incapable of upholding the credit and the glorious traditions of England's Army in its hour of need.'"

A FEW SANITARY RULES TO SECURE HEALTH, AND TO PRESERVE AND PROLONG LIFE.

1. "EVERY man that striveth for the mastery is temperate in all things."

Let the mind rule the body. He who sows ease and comfort will not reap honour and glory.

2. Breathe pure air.

3. Look to your drains and traps.

4. Live in a healthy situation and aspect. "Where the sun does not enter, the doctor does," is a maxim of the most ancient date.

5. Keep your surroundings scrupulously clean.

6. In a bivouac, sleep a little above the ground, and do not disturb the surface unnecessarily, or you may suffer from unhealthy emanations from the soil.

7. Drink pure water, and if there is the least doubt about its purity, boil it.

8. Pay strict attention to personal cleanliness, in body and clothes. A man who does not clean his teeth is a dirty fellow. The investigations of the Congress of Hygiene * showed a fearful neglect of the teeth in the Navy and Army.

9. Eat what is wholesome and clean, and regulate your food by the amount of exercise and work.

* Hygiene—health, or the art or science of preserving health.

Those who lead a sedentary life are apt to become dyspeptic. Masticate slowly, and encourage conversation and merriment during meals.

10. Avoid chills. Not changing wet boots or wet clothes is very dangerous. Wear woollen underclothing.

11. Take sufficient outdoor exercise and combine amusement if possible.

12. Remember that children are much more susceptible to disease than adults.

13. Excessive smoking produces many evils. Only mild tobacco should be used. Smoking in the early morning is bad, and so it is before eating.

14. In hot climates protect the head, temples and nape of the neck from the sun. In India the sun is certainly dangerous, but neglect of sanitation is responsible for far more deaths than the sun.

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